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Incorporation of GSR into Army Environmental Remediation

Environment, Energy & Sustainability Symposium and Exhibition (E2S2)

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Overview



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- OSD GSR Policy
- Headquarters GSR Overview
- Corps of Engineers GSR Study
- Army Headquarters Next Steps



A former DERP site, Fort Bragg promotes public access to the installation by providing a number of recreational opportunities, such as bird-watching, on its 18-mile All-American Trail, a registered North Carolina Birding Trail, located on remediated land.

Photo: Elizabeth Evans, Fort Bragg

www.army.mil/-images/2010/04/20/70522/



OSD GSR Policy



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- August 2009 Office of the Secretary of Defense (OSD) Policy Memo:
 - Consider and implement Green and Sustainable Remediation (GSR) practices “where and when they make sense” (August 10, 2009)
 - DoD Components requested to brief OSD on current efforts, strategies, and future plans

Green and Sustainable Remediation

Minimize the overall environmental footprint through the following activities:

- Evaluate sustainability during remedy selection
- Evaluate sustainability of existing remediation systems
- Preserve natural resources
- Minimize energy use and increase energy efficiency
- Minimize emissions
- Use passive sampling
- Minimize fresh water consumption and maximize water reuse
- Maximize recycling, reuse, and reduction of materials
- Consider use of environmental remediation technologies with inherently sustainable aspects



Headquarters GSR Overview



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- Army GSR Strategy:
 - Sustainability concepts addressed in the 2004 Army Strategy for the Environment
 - Green remediation specifically included in FY10-11 Army Environmental Cleanup Strategic Plan
- Ongoing efforts:
 - Participate and partner with other agencies
 - Conduct Pilot Projects
 - Optimize Existing Remedies
 - Utilize Sustainability Tools



Colorado Gov. Bill Ritter Jr. and Maj. Gen. Mark A. Graham, commanding general, Division West, First Army and Fort Carson, prepare to cut the ribbon on the 15-acre Fort Carson solar array.

Photo: Michael J. Pach

www.army.mil/images/2008/01/17/12170/



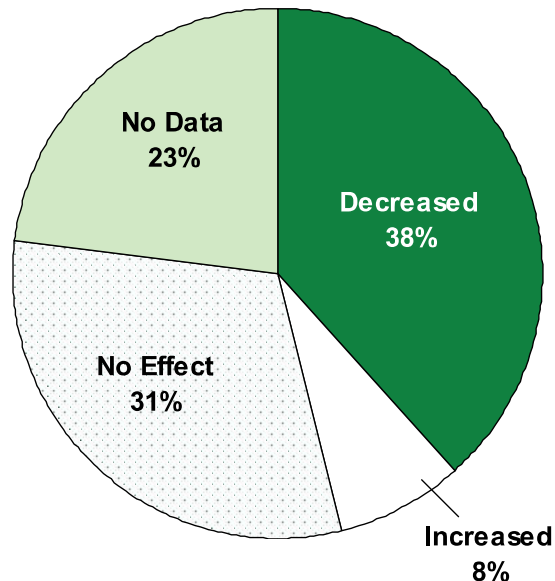
GSR In Practice: Field Survey



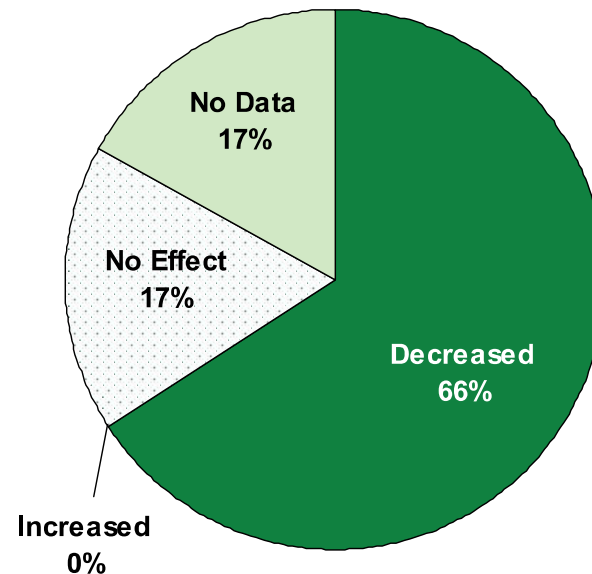
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- Army HQ developed a field survey to capture the broad nature and scope of Army GSR practices
- Initial scope: Tasked to all Army Commands (AEC, BRAC-D, HQUSACE, NGB) for distribution to field.
- Received 47 survey responses from 28 installations
- Installations: 12 Active, 8 BRAC, 6 FUDS, 2 NGB

Effect on Site Closeout Time



Effect on Project Cost



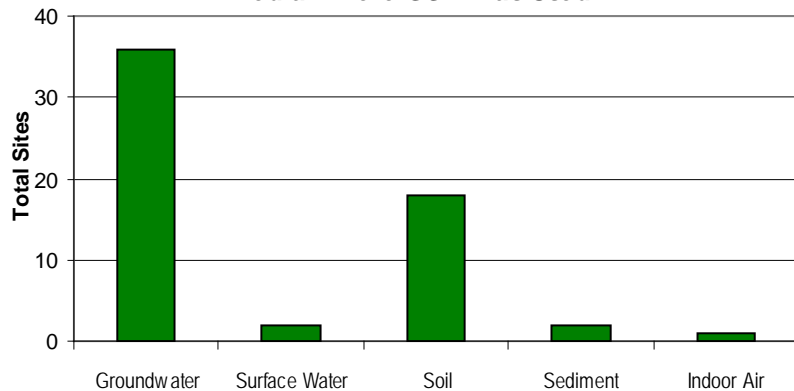


GSR Remedies and Best Practices

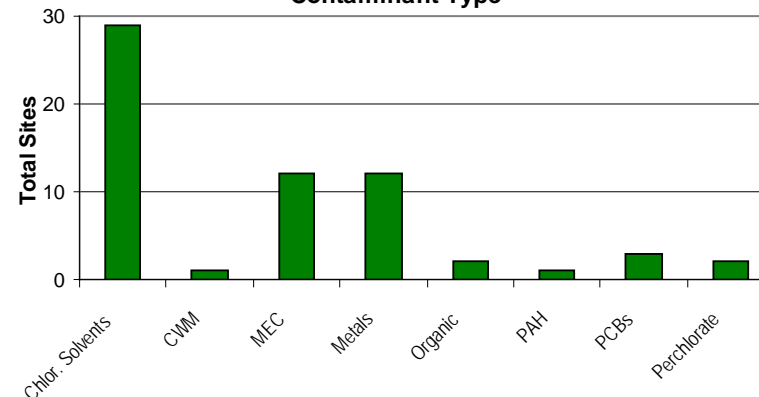


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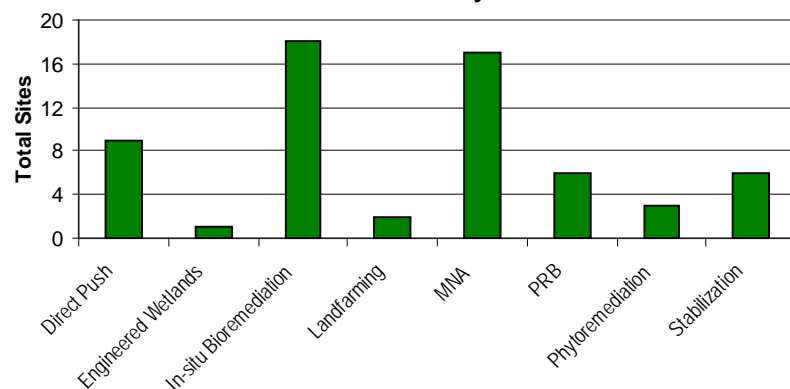
Media Where GSR Was Used



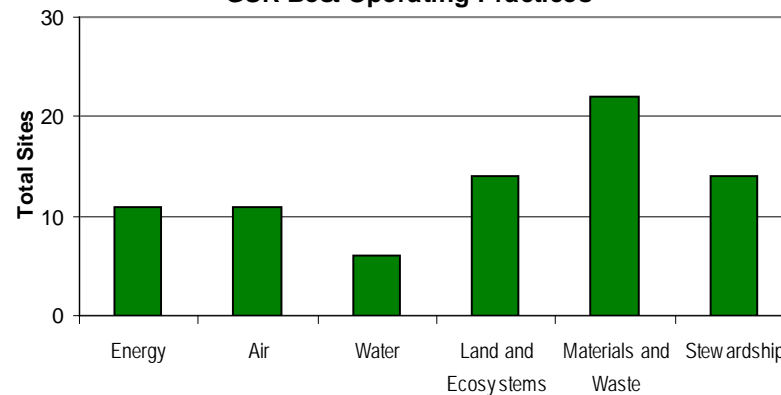
Contaminant Type



GSR Remedy



GSR Best Operating Practices



* Survey respondents were asked to check all that apply, so the sum within each table may be higher than the total number of surveys received.



Active and BRAC Sites, Army Database Analysis



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- Most widely used GSR Remedies include the following:
 - On-Site Treatment
 - In-Situ Soil Treatment (133 sites)
 - Ex Situ Soil Treatment (114 sites)
 - Solidification/Stabilization (58 sites)
 - Soil Washing (9 sites)
 - Treatment that Mimics a Natural Process
 - Natural Attenuation (501 sites)
 - Bioremediation (154 sites)
 - Bioremediation – In Situ Groundwater (126 site)
 - Bioremediation – In Situ (62 sites)
 - Bioventing (41 sites)
 - Passive Treatment Wells (33 sites)
 - Composting (32 sites)
 - Landfarming (12 sites)
 - Alternate Habitat (3 sites)
 - Slurry-Phase Bioremediation (3 sites)

Because of limited GSR data reported in current data systems, not all sites using green or sustainable remedies are reflected in this list



GSR Study



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- Army funded a study with the Corps of Engineers to provide the information necessary and the recommendations for the consideration and/or development of Army-wide Green and Sustainable Remediation (GSR) guidance and policy
- Study Description:
 - Follow the consideration and incorporation of GSR practices into Army environmental remediation projects
 - Ascertain the effectiveness of the GSR practices that are considered and incorporated
 - Provide procedures by which GSR practices that are shown to be effective can be identified, considered, implemented and documented by Project Teams working on Army sites
 - Study starting with the USACE GSR Interim Guidance (http://www.environmental.usace.army.mil/pdf/IG%2010-01%2003_05_10%20doc.pdf.) and will revise the procedures per the Study results



Study Team



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OACISM

- Kevin Roughgarden

USACE Environmental and Munitions CX

- Carol Dona (PM)
- Nick Stolte and Deborah Walker (MMRP)

Tetra Tech (Contractor to USACE)

- Rob Greenwald (project manager)
- Doug Sutton (IRP GSR lead)
- Michelle Caruso (MMRP GSR lead)

Others

- Army National Guard Bureau (NBG)
- Army Environmental Command (AEC)
- Deputy Assistant Secretary of the Army for Environment, Safety, and Occupational Health [DASA(ESOH)]
- Formerly Used Defense Sites (FUDS)
- Military Munitions Support Services (M2S2)
- USACE Engineering and Support Center, Huntsville
- Army Environmental Policy Institute (AEPI)



Study Process



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- 12 Army environmental remediation projects/pilots: GSR practices identified and the consideration, incorporation, and documentation by the PT followed
- Projects chosen across Army components (FUDS, BRAC, IRP, National Guard), across IRP and MMRP programs, and across remedial phase (planning to site closeout)
- GSR evaluation report identifying potential GSR opportunities supplied to project team
- Study team follows and documents project team GSR consideration and incorporation – what makes sense and when and where



Pilot GSR Projects for Study



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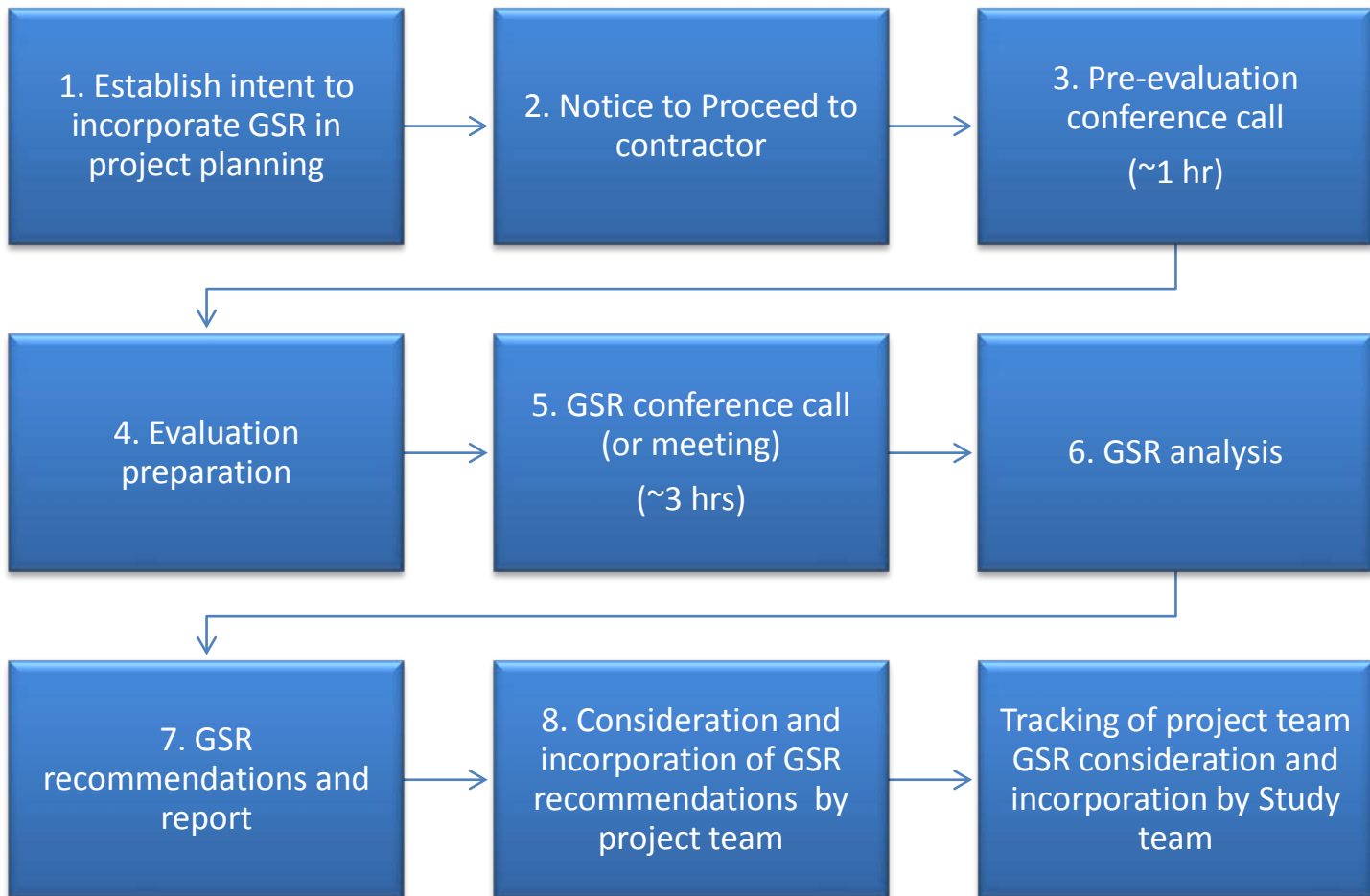
| Project Description | Program | Phase |
|--|--------------------|--------------|
| Pump and Treat (P&T) with MNA | IRP – FUDS | RD |
| P&T Replacement (PRB and/or MNA) | IRP – BRAC | FS/ESD/RD |
| Consolidation/Capping of Landfill | IRP – FUDS | RD |
| Petroleum Soil Remediation | IRP – NGB | RA |
| Munitions Remediation | MMRP – NGB | RI/FS |
| In-situ Bio/MNA | IRP – Active Army | FS |
| Munitions Remediation | MMRP – Active Army | FS |
| Chemical Warfare Material Remediation | MMRP – FUDS | RI/FS |
| Optimization P&T's, Source Removal | IRP – Active Army | RA-O |
| MNA w, w/o Source Removal | IRP – FUDS | Post FS (PP) |
| SI/RI Planning | IRP – FUDS | SI/RI |



GSR Approach (Steps) Implemented in the Study



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Schedule for Each Pilot



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| Task | Duration of Task | Days from “Step 5” Call/Meeting |
|---|------------------|---------------------------------|
| Introductory Teleconference (Step 3 Call) | ~1 hour | N/A |
| Kick-off Teleconference (Step 5 Call/Meeting) | ~3 hours | 0 |
| Draft GSR Evaluation | 21 days | 21 |
| Comments from USACE | 10 days | 31 |
| Draft Final GSR Evaluation | 10 days | 41 |
| Comments from USACE, ACSIM, Project Team | 21 days | 62 |
| Final GSR Evaluation | 10 days | 72 |

For some of the pilots an expedited schedule without the first draft has been requested so that the GSR findings can be available sooner



Ways GSR Can Be Incorporated



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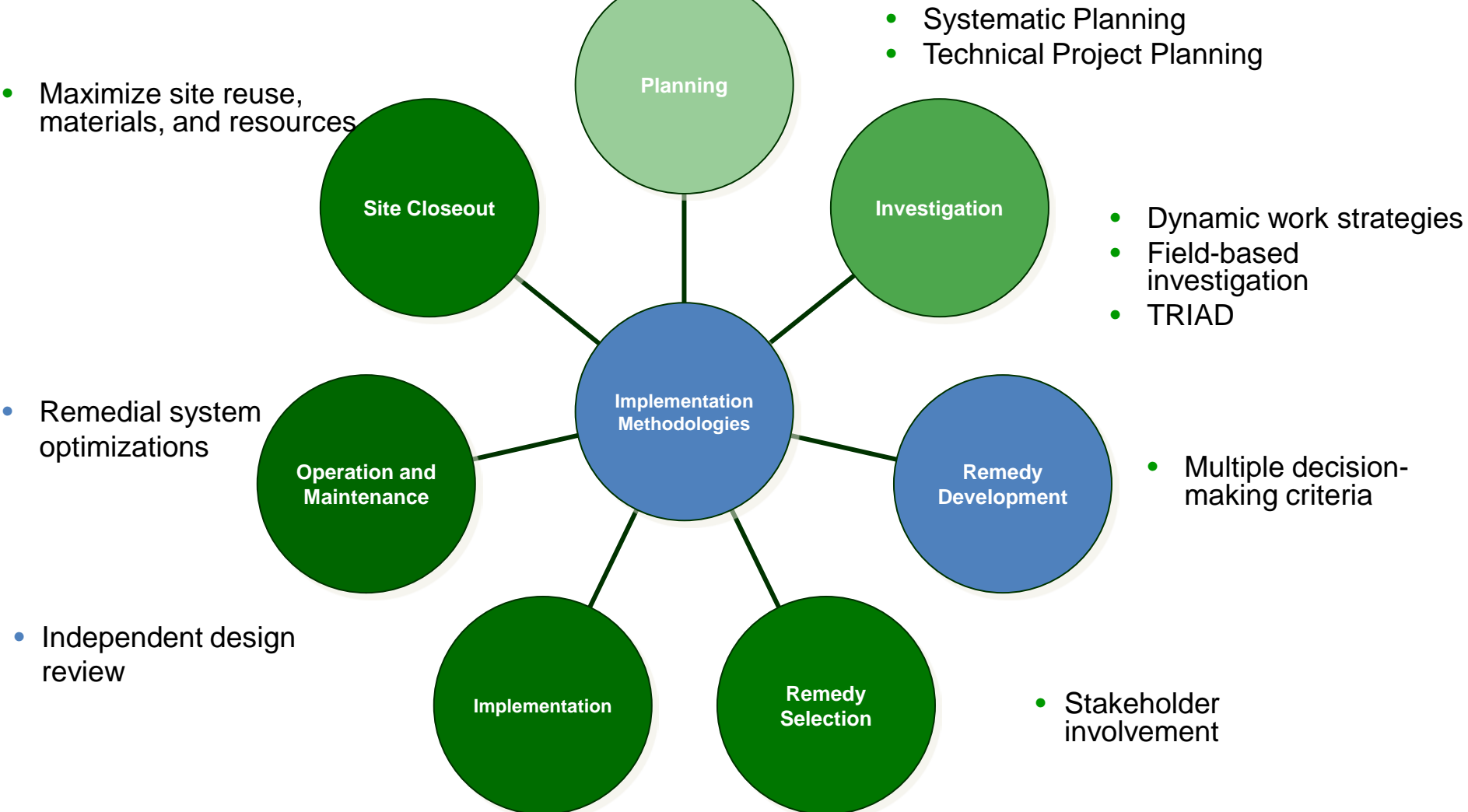
- Methodologies
 - Systematic Planning
 - Dynamic and multi-criteria decision making
 - Independent Review
 - Stakeholder Involvement
 - Maximize Site Reuse/Materials
- Best Management Practices
- GSR Quantitative Footprints for Comparison of Different Options



Methodologies



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Pilot Example of Methodology Application: Independent Design Review



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| Recommendation | |
|---|--|
| Design P&T to address two plume lobes with separate treatment plants rather than one centrally located treatment plant, plus implement VFDs for extraction pumps | |
| Basis for Recommendation | |
| Eliminates ~20,000 ft of piping and associated piping. Lowers electrical use due to reduced pumping head plus use of VFDs. Provides greater treatment flexibility. Requires an extra building and some duplicate equipment. | |
| Resources Conserved | |
| Reduces footprints over remedy lifetime (30 years) such as: | |
| <ul style="list-style-type: none">• Electricity usage – 12 million kWh• Energy – 120,000 MMBtu• CO2e – 10,000 metric tons | <ul style="list-style-type: none">• NOx - 20 metric tons• SOx - 30 metric tons• HDPE – 600,000 lbs |
| Estimated Costs/Savings | |
| Up-Front Savings ~\$609,500 | Payback Period: Immediate |
| Annual Savings ~\$27,000/yr | Lifecycle Savings ~\$1,100,000 NPV |



GSR BMPs



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- Many different categories of BMPs
 - Planning
 - Characterization and/or Remedy Approach
 - Energy/Emissions - Transportation
 - Energy/Emissions - Equipment Use
 - Materials & Off-Site Services
 - Water Resource Use
 - Waste Generation, Disposal, and Recycling
 - Land Use, Ecosystems, and Cultural Resources
 - Safety and Community
 - Other Site-Specific BMPs
- Example BMPs
 - Reduce idling time for construction equipment
 - Select transportation routes for trucks and heavy equipment that minimize impacts to residential areas to maximize safety and minimize noise and other aesthetic impacts



Pilot Example of BMP Application: Electronic Deliverables



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| Recommendation | |
|---|------------------------------|
| Submit report appendices and lab reports on CD | |
| Basis for Recommendation | |
| <ul style="list-style-type: none">• Annual report is distributed in both hard copy and electronic forms• Recommended that lab data and other appendices be distributed electronically instead of hard copy | |
| Resources Conserved | |
| Saves paper, shipping, storage space | |
| Qualitatively reduces hazardous air pollutants, criteria pollutants, GHG emissions, energy, materials, and water (not specifically quantified) | |
| Qualitative Cost Impact Over 5 Years | Level of Up-Front Investment |
| Cost Savings | Negligible |



Quantitative GSR Footprints



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- Need GSR Evaluation Tool
 - Publicly Available tools
 - Air Force Sustainable Remediation Tool (SRT), developed by AECOM, GSI, and CH2MHill
<http://www.afcee.af.mil/resources/technologytransfer/programsandinitiatives/sustainableremediation/srt/index.asp>
 - SiteWise™ Green and Sustainable Remediation (GSR) Tool, co-developed by Battelle, the Navy, the Army, and the USACE
www.ert2.org/t2gsrportal/tools.aspx
- SiteWise™ primary tool used in Study
 - Information such as material use, vehicles and distances for transportation, and equipment use is obtained from the project
 - The information is entered into tables on an “input sheet” by typing values and using drawdown menus
 - SiteWise™ uses conversion factors to calculate GSR parameters based on the input
 - For metrics not in SiteWise™ manual calculations are performed, including upfront cost, discounted and undiscounted total costs, and payback periods



Example of Quantitative GSR Footprint: Use of Variable Frequency Drives



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| Recommendation | |
|---|---------------------------------|
| Include VFDs for air stripper blower motor | |
| Basis for Recommendation | |
| Reduces footprints for energy use, CO ₂ e, criteria pollutants, and water used to generate electricity. Requires minimal up-front cost, and has a payback period of approximately 3 years. Does not appear to have any significant negative impacts. | |
| Resources Conserved | |
| Reduces footprints over remedy lifetime (30 years) by the following amounts: | |
| <ul style="list-style-type: none">Electricity Usage - 1.5 million kWhEnergy - 16,000 MMBtuCO₂e - 1,300 metric tonsNO_x - 2.6 metric tonsSO_x - 4.5 metric tonsWater - 770,000 gallons | |
| Estimated Costs/Savings | |
| Up-Front Cost ~\$7,500 | Payback Period <3 yrs |
| Annual Savings ~\$3,300/yr | Lifecycle Savings ~\$57,000 NPV |



Overall Study Schedule



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| Task | FY10 | FY11 | | | | FY12 |
|---------------------------------------|------|------|----|----|----|------|
| | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 |
| Develop Process for Applying GSR | | | | | | |
| GSR Evaluations for 12 Pilot Projects | | | | | | |
| Draft and Final Study Report | | | | | | |

- One combined GSR process for IRP and MMRP projects; process will be applied/tested for pilot projects
- Process will be modified and finalized in Study Report based on findings from pilot projects
- Study Report will have recommendations for Army-wide guidance and policy, also revisions to USACE GSR interim guidance



Current Study Status



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| Current Project Status | |
|--|-----------------|
| Draft Final Study Approach Completed (will be modified with Study Results for approach to be used by Army project teams) | |
| Projects | |
| Project Stage | No. of Projects |
| Project teams agree to participate in Study | 12 |
| Introductory Step 3 calls completed | 11 |
| Step 5 calls scheduled/completed | 6/5 |
| Draft GSR evaluation reports completed, in review by project teams | 5 |
| GSR incorporation complete | 1 |



Army HQ Next Steps



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Guidance

- Incorporate GSR guidance into the Army DERP manuals
- Evaluate need for specific Army GSR guidance
- Determine applicability of USACE Decision Framework to larger Army environmental remediation program

Resources and Case Studies

- Create a information exchange through Army Sustainability Web site housing GSR guidance, practices, tools and other available resources
- Continue to develop and test process for GSR consideration and implementation
- Develop and standardize GSR contract language

Performance Measures

- Continue developing standardized performance measures (metrics)
- Incorporate metrics in revised and new Army databases



Questions?



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